

Profit sharing between managers and investors: An experimental investigation

Belma Ozturkkal*

School of Economics, Administrative and Social Sciences, Department of International Trade and Finance, Kadir Has University, Istanbul, Turkey

Received 7 July 2014; revised 7 February 2015; accepted 7 February 2015

Available online 3 March 2015

Abstract

This study analyzes the effect of interest and power structures and conflict of interest among managers and investors and tests the effect of different payout mechanisms on willingness to pay. In this study 74 student subjects are involved in a setting where the manager is determining his own compensation. A series of experiments that vary managers' ability to determine their own compensation and investors' ability to punish inappropriate behavior are reported. The experiments involve pairs of subjects consisting of an investor and a manager with asymmetric decision making powers. When managers compensate themselves inappropriately, investors' recourse is to shun the company's shares—a model that arguably corresponds more closely to reality than the accepted efficient market traditional paradigm. The experiment shows that managers share profits even when investors cannot withhold investment and investors fairly compensate managers as well. This pattern explains both the ability of capital markets to function despite the presence of inherent moral hazard, and occasional managerial misbehavior.

Copyright © 2015, Borsa İstanbul Anonim Şirketi. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

JEL codes: G02; G03

Keywords: Behavioral finance; Payout policy; Experiment

1. Introduction¹

On February 11th 2009 it was revealed that the 700 top executives at Merrill Lynch (today part of Bank of America) received bonuses of US\$3.6 billion and another 149 employees received US\$858 million according to the New York Times, while the company experienced US\$27.6 billion in

losses for the full year. This is one example of corporate executives destroying the value generated by a firm. Other notable examples include General Electric, Citibank, AIG and Morgan Stanley. In the same year many hedge fund scandals became public, where various managers (most infamously Bernie Madoff) extracted assets from the fund as a result of weak governance. In response to each of these news items, worried investors drove share prices lower. Such incidents receive abundant media attention but are for the most part rare relative to the number of firms. Another angle is that investors are changing to become more hands-on than before and some reduction of CEO pay through the shareholder monitoring mechanism can be affected (Ertimur, Muslu, and Ferri (2009)). Nevertheless, current practice brings into question whether the traditional manager-investor model in finance is missing a critical moral hazard problem on the part of managers. Sappington (1991) focuses on surplus division between principal and agent (investor and manager in this experiment) and

* Tel.: +90 212 5336532 1603.

E-mail address: belma.ozturkkal@khas.edu.tr.

Peer review under responsibility of Borsa İstanbul Anonim Şirketi.

¹ The author would like to thank Professor Ernan Haruvy, for his guidance and valuable suggestions for this study. The author thanks Professor Catherine Eckel and Professor Rachel Croson for their notable comments in this study. This experiment was performed while the author was visiting University of Texas, Dallas. The author would like to thank Dean Professor Hasan Pirkul and Professor Robert Kieschnick and the Department of Finance and School of Management for their hospitality. The author also thanks the Sam Houston State University Business Conference participants, and the University of Texas at Dallas Finance Seminar participants for their comments.

discusses the symmetry of pre-contractual beliefs. In the absence of the same beliefs, efficient levels of performance and surplus division may not be achieved and this may cause problems. Additionally, principals and agents may not have aligned goals where agents act as self-interested individuals maximizing their own income and may perform little to avoid bad outcomes for the company. Crotty (1990) notes investors and managers have different objectives and information sets according to Keynes' analysis. The aim of this study is to contribute to fill the gap and analyze the moral hazard problem by analysis of investor and manager profit sharing in a simplified environment, where the focus is on how investor willingness to pay (WTP) and manager compensation are related and what happens with changes in company income distribution for investors and managers.

In this study a paradigm where there are two classes of stakeholders - a manager class and an investor class-is studied. Capital and management are the two inputs for the firm's production function and each is indispensable. That is, without either capital or management, no production can take place and a unit of production is foregone. The manager's role in this setting is not specifically modeled. That is, the manager's simplified role in this setting is merely to be present at the time of production. For that function the manager receives compensation to be determined either by management or investors. The manager's compensation may be determined by the investor or by the manager himself (as suggested by the examples discussed above) and managerial misbehavior was rare). Several variations on this setting are run, varying the way manager's compensation is determined. The results show that the investors indeed adjust asset prices in response to managers' actions. Surprisingly, despite potential for abuse, managerial expropriation of profits is limited. Different functional forms are attempted to allow for the investor's utility. The findings suggest that certain axioms of rationality are violated (e.g., De Bondt, 1998). Statman (2014) notes people are more normal (occasionally irrational) than rational, markets are not efficient and behavioral differences in decisions affect investments and outcomes. It is difficult to change mental frames when individuals use past prices as an anchor and their perceptions of value are overly optimistic. The findings support the previous work of Haruvy, Lahav, and Noussair (2007) that beliefs are adaptive and based on past trends.

In the third setting of the experiment, there is a manager who decides the dividend and possibly his own compensation. The investor must then decide how much the share is worth and this will depend largely on his trust in the manager. Thus, three crucial elements in the setting are identified: (1) the effect of dividends on asset price, (2) the moral hazard inherent in some forms of managerial compensation, and (3) trust between investors and managers. Prior to this study various other studies only address the first two issues mostly separately.

This study contributes an analysis combining all three of the above aspects.

The effect of dividends on asset price. Dividends may have an important role to play in a company's valuation. Managers

have private information on the company's future cash flow generation and increase or decrease the dividend payout according to private information available to them. Thus, dividends may have an informational content where a change in the dividend policy may be interpreted by the investors as a change in management's view about future prospects of the firm. Brav, Graham, Harvey, and Michaely (2005) find that executives believe that dividend and repurchase decisions convey information to investors. In general the belief is that decreasing dividends can be particularly harmful. Consistent with that view, Allen and Michaely (1995) find that the market reacts positively to dividend increases and negatively to dividend decreases. However, the opposite pattern may very well be the case. Benartzi, Michaely, and Thaler (1997) find that firms that cut dividends have positive unexpected earnings in the first year. The dividend increasing firms do not show an obvious positive pattern of unexpected earnings in years one and two. Lastly, Black and Scholes (1974) show that the effect dividend policy will have on the asset price cannot be foretold.

Managerial compensation. Cremers and Palia (2010) analyze US data of 2200 firms and 3200 CEO's between 1992 and 2007 and find that there is a positive relation between CEO pay and tenure. The findings are consistent with career concerns and dynamic learning hypotheses. Fosberg (1997) reports that significant dividend increases affect CEO compensation significantly over a two year period. Gerhart, Rynes, and Fulmer (2009) review the literature and suggest that a strong link between pay and performance can be an excellent motivation for managers, however sometimes this motivation may lead to unanticipated outcomes. Furthermore, Dalton, Daily, Certo, and Roengpitya (2003) study ownership in companies and performance using different measures such as Tobin's Q, return on assets, return on equity, earnings per share (EPS) and price-to-earnings ratio, and do not find support for agency theory's link to manager and performance, with the exception of EPS as a variable related to officer and director equity. John and John (1993) argue that managerial compensation is designed to give the managers incentives to choose actions to increase shareholder wealth. An agency problem arises when investors and management have different interests. The experiment attempts to address the problem where managers seek their own interests instead of the investors' interests. To align the interests of both parties compensation should be carefully structured by the investors (e.g. Ryan & Wiggins, 2001). However, until recently small shareholders had limited or no power for determining managerial compensation. Until a few years ago, attempts by shareholders to curb executive bonuses have typically been rebuffed by the boards. Tosi, Werner, Katz, and Gomez-Mejia (2000) note that the executives are highly informed about a company and investors cannot closely supervise the executives and company operations. Thus, the managers can use resources for their own benefit and may not maximize the interests of shareholders. Furthermore, they state that firm size is important, however firm profitability is not as prioritized as executive compensation.

One recent experimental study in this field was structured by Ariely (2010, chap. 1) who conducted an experiment, where the subjects were motivated by extreme rewards similar to CEO compensation in the US finance sector prior to 2007. In this experiment the highest compensated subjects showed the lowest performance.

Trust. Trust is a key element in the investor–manager relationship. Guiso, Sapienza, and Zingales (2008) define trust as the subjective probability individuals attribute to the possibility of being cheated. They find that trust has a large and positive effect on investment in stocks. The findings show that better informed and more educated people rely less on trust and social people hold more stocks and exhibit more trust. Camerer (2003) finds that early on in a strategic interaction there is strategic trust regarding future benefits but this trust diminishes as future benefit shrinks towards the end of interaction. Camerer, Johnson, Sen, and Rymon (2002) also demonstrate that people do not look ahead nor use backwards induction reasoning. Berg, Dickhaut, and McCabe (1995) measure investors' appropriate reward behavior in an experiment and show that fairness and trust have effects on reciprocity and kindness towards one's counterparty. Lunawat (2013, 2012) find that investment is higher in a voluntary information disclosure regime where managers disclose information about dividends and that this improves both parties' welfare when the role of trust in the separation of ownership and control is analyzed.

1.1. Research questions

This study is different from previous research in the sense that it is not trying to measure the appropriate level of managers' compensation, however, the aim is to observe whether self-centered behavior occurs when the investor and manager are left free to make their decisions. In the traditional manager-investor paradigm in the economics and business literature, the manager is the employee of the investor-owner. In agency theoretical terms, the manager is the agent and the investor is the principal. The main issue in that literature is to properly align manager incentives with those of the investor-owner (executive compensation) and investor control (board selection, auditing).

Falk and Kosfeld (2006) study the interaction of control and motivation in an experimental principal-agent game and find that control brought about results where managers perceive control as a signal of distrust and a limitation of their autonomous position. They report variance in performance at low and high wages, where control leads to lower performance at high wages. One example of the disadvantages of lack of control is the mad rush by some executives to award large bonuses at failing financial institutions facing clear ruin. Investors' only recourse is often to dump shares. Bertrand and Mullainathan (2001) investigate the link between agency issues and CEO pay and report that better governed firms pay their CEO's a less amount for luck since firms with large shareholders and smaller boards are better at excluding this luck component when determining pay. While

this view of the world allows for neat mechanism design implementations, it appears a bit out of touch with the investor–manager relationship observed in the financial sector in the US before 2008. Reality suggests that at least in some cases top executives largely determined their own compensation. These incentive schemes are often not in the investors' best interest. The aspect that is not analyzed in depth in the traditional paradigm is the idea that investors have some say on compensation, perhaps through representation on the board or through voting rights. Ertimur et al. (2009) studied 1198 shareholder proposals between 1997 and 2007 and found that there is some reduction of CEO pay through the shareholder monitoring mechanism, indeed this monitoring mechanism helped led to the resignation of the CEO of Citibank in 2012.

The traditional *investor-is-the-owner* view would call for reform of boards as well as manager's compensation. So the goal here is to study the manager-investor game as can be seen, characterize its theoretical equilibrium in the absence of exogenous shocks, and then examine behavioral implications. In particular, we seek insights into what an unscrupulous manager might do in a system like this, and how behavior interacts with compensation considerations.

1.1.1. Model

The model has two inputs of production: management and capital. The firm needs both inputs, in some pre-determined quantities, to acquire each unit of production capacity. For a unit of production capacity to be acquired in a period, the manager has to provide one unit of management, which is linked to a bonus compensation mechanism. The investor must provide capital. In addition to the manager and investor, there is non-strategic broker who mediates the share selling transaction. Of the price paid per share, a certain proportion goes to buy the productive capacity, and the rest is divided between broker and manager (90:10 in this example).

Each unit of productive capacity results in output (profit) from a known distribution. The manager in the main setting under investigation has sole decision making power in how the profit is to be divided between investor and manager. He divides the profit for a period by issuing a dividend for the period. The dividend may be greater or smaller than the profit for that period. The game is repeated for n rounds. First a finite version (10-periods) of this game is studied to analyze principal-agent surplus distribution under different settings. At the end of round ten the company dissolves and has no value.

The easiest setting to characterize is one where the manager declares the dividend after the investor makes the purchase decision in each period. In period 10, the manager should declare no dividend regardless of investor action. Then the investor in period 10, correctly anticipating such action, should not be willing to purchase any shares—i.e., be willing to pay zero dollars per share. Anticipating this, the manager in period 9 has no incentive to offer a dividend, and so on. The game unravels to where no shares are purchased and no production ever takes place.

1.1.2. Behavioral models

Two alternative behavioral models come to mind. One is a consideration for fairness by the manager. The manager may care about equal division of surplus. In that case, the following predictions arise:

H1. Dividend payment depends on the profit realization in a period.

H2. Price paid by the investor depends on the dividend payment.²

Miller and Rock (1985) state dividends convey information by signaling future earnings. However, dividends can be misleading about the true value of the firm as managers have incentives to manipulate share prices. Kumar (1988) states there are signaling models but the empirical evidence shows that dividends are not leading indicators of future earnings but more a lagging indicator of past earnings.³ Increases in dividends cause increases in prices with a low signal as indication for future earnings. Dividends will not vary one-to-one with the prospects of the firm but will signal only a broad quality of the firm as there exists a conflict of interest between manager and shareholders.

The second model is a strategic one. Fehr and Gächter (2000) note in people's behavior reciprocity is an outcome frequently observed contrary to expectations of self-interest. Some people act fair-mindedly in general, however they may act self-interestedly in competitive markets. Likewise, self-interested people may act fair in strategic environments. The manager may wish to signal that he might be fair-minded. In that case, the manager should behave as a fair person would behave, until shortly before the terminal date, where such behavior no longer pays off. At that time, as one approaches termination, the manager should defect. If they are economically rational actors a clear cut break from positive dividend to zero dividends at some point towards the end should be observed.

H3a. There should be a decline in dividends over time.

Consequently, rational investors should respond accordingly and decrease their WTP as the session progresses.

H3b. Investors decrease their willingness to pay over time.

1.1.3. Tests for fairness considerations

The benchmark condition is the setting described above. Under the hypothesis that the manager is fairness minded (non-strategic), this should make a difference in allocation proportion (conditional on period profit and price, etc.) and whether the dividend is announced before or after the investor decides on price. Strategically, however, the backward induction argument fails if the manager announces dividends

before the investor makes a choice. So this is a fair test for strategic behavior on the part of the manager. Hypothesis 4 is stated in two parts. Part (a) pertains to the investor's rational anticipation of the manager's behavior during the experiment where the manager decides the dividend before the investor bids for price and part (b) pertains to the investor's decision for the dividend and the manager's strategic behavior with an exit option.

H4a. The willingness to pay by the investor in a setting where the manager declares dividends before trading will differ from the willingness to pay by the investor in a setting where the manager declares dividends after trading or the investor declares the dividend.

H4b. The willingness to pay by the investor in a setting where the investor declares dividends will differ from the proportional allocation of surplus in a setting where the manager declares dividends.

Finally, we need to know what constitutes the utility maximizing allocation in the investor's mind. That is, if the investor or the manager was truly the owner of the company, how would they like to divide the surplus between themselves? Note that this is not a “fair” allocation per se. It is the allocation that in theory maximizes one party's utility given his own other-regarding preferences. It is a decent benchmark for what the investor or the manager would like to get both in absolute dollar terms as well in percentage of surplus terms. It is also an unbiased estimate of total surplus. This brings us to the next hypothesis. This paper is related to Fehr, Krehmelmer, and Schmidt's (2008) analysis from a trust perspective, where they report experiments on allocation of ownership rights with respect to fairness. They cannot explain the outcome with self-interest theory. Contrary to expectations, they find that joint-ownership is the most efficient form of ownership although they start from different initial conditions.

H5. The proportional allocation of profit of the investor will depend on the profit of the manager.

2. Method

2.1. Experimental design

The study involved 74 student subjects from a major public university in the southern United States. No subject participated in multiple sessions. This study was run in 10 sessions. Each session used one of three treatments explained in Table 1 below and lasted about 30 min including instruction time. Each session also paired students together as manager and

Table 1
Experiment design.

Treatment	# Subjects	# Rounds
“Dividend before.” Dividend announced before trading	24	10
“Dividend after.” Dividend announced after trading	30	10
“Investor control.” Dividend decided by the Investor	20	10

² This hypothesis is supported by Demirtas and Zirek's (2011) findings that aggregate returns are linked to earnings in emerging markets and the earnings of the company are used to predict future returns.

³ Kirkulak and Kurt (2010) reconfirm that earnings are a major source help to determine the dividends.

investor. Each manager and each investor were initially given 500 experimental tokens (200 token = \$1) and no shares. Shares purchased throughout the experiment carried no value at the end of the experiment. The manager and the investor were each compensated according to their final profit at the end of the experiment. Shares purchased by the investor in each round continued to earn the applicable dividend of each successive round as decided by the manager. The z-Tree program (Fischbacher, 2007) was used as the user interface for the computerized experiments. Subjects earned anywhere from \$2 to \$6 each for about 10–15 min of participation.

Table 1 reports a summary of three treatments with 10 periods each. In Treatment “Dividend Before”, the subject in the role of manager determined and announced the dividend before the investor had the opportunity to buy in each period. In Treatment “Dividend After”, the subject in the role of manager determined and announced the dividend after the trade decision was completed by the investor in the period. In Treatment “Investor Control”, the investor decided on the dividend before making the trade decision. All other aspects were kept identical across treatments.

There is a firm the investor can invest in and in each round the firm yields a profit per share outstanding. The *profit-per-share* is a random number between 2 and 12 tokens, where each round has a different profit per share. The profit per share for each round is known only to the manager and not communicated to the investor. However, on average, this profit is 7 tokens per round (70 tokens over 10 rounds).

In each round, the investor announces a price which he is willing to pay for one share. This number is randomly selected by the computer between 0 and 90 for 10 rounds. The investor's stated price and a random number generated by the computer determine whether the investor buys a share. The share price and ownership is decided according to the Becker-DeGroot-Marschak method. If the investor's price exceeds the computer generated random price, he buys a share at the second highest price (the computer's price). If the investor buys a share, he gets the dividend announced for the round plus all future dividends announced in future rounds for this share. If a share is purchased, the manager earns a 10% commission on the market price and all shares held in a round get the same dividend in that round. This is to ensure that the managers are compensated parallel to real life examples to align the executives' and investors' incentives, where the increase of the share price benefits both parties and if the company goes bankrupt then both parties are worse off.

This experiment links the manager and investor directly and questions if they can mutually exist in an efficient environment. The different designs are structured to see if decisions are influenced by different treatments. The aim is to determine if the manager and investor are selfish in surplus division and how strategically the manager and investor interact. This experiment introduces a simplified environment of real life capital markets, where only one asset is introduced with a finite life and it is similar to other experimental studies for ultimatum game studies from a fairness point of view. The contribution of this study is that it considers the capital market example where the surplus distribution and fairness of investors and managers under different settings is questioned with a closer link to real life with trading.

3. Results

Contrary to what one would expect, results indicate that the managers and investors do not conform to the purely selfish model of behavior in surplus division. On the one hand, investors are paying high prices when it is not economically rational by backwards induction to do so. On the other hand, managers do not expropriate the entire profit, even later in the life of the asset. Over treatments, an average of 90% of firm profit is distributed to investors although the managers decrease the dividends towards the end of the experiment to 70% averaged over treatments. Camerer (2003) notes that strategic trust diminishes towards the end of the interaction and the present finding is in line with that theory. With few exceptions the observation shows that investors and managers behave fairly to the other party even when it is not rational to do so. Interestingly, the results show that the managers are more generous as decision maker for dividend distribution compared to investors. The majority of the investors are paying high prices to purchase the share especially in the second part of the experiment proving that they do not use backward-induction strategy.

Table 2 reports that the dividend is lowest when the investor decides on distribution (74%) whereas when the manager announces the dividend prior to trading, the dividend is highest (110%). All findings of all participants in our experiment, however far they deviate from the mean are analyzed, since in real life sometimes companies such as General Motors continue to distribute dividends for signaling purposes, when they were unprofitable. Overprice is defined as the investor's paying an $x\%$ higher price than the rational

Table 2
Experiment results.

Treatment	Payout ratio %	T-test for Payout ratio	Last period Payout ratio %	T-test for last period payout ratio	WTP	T-test for WTP	Cumulative shares	Investor's overprice %
T1. Dividend before	110		76		35		3.8	47
T2. Dividend after	88	0.01**	56	0.21	43	0.07*	4.8	84
T3. Investor control	74	0.00**	82	0.80	50	0.00**	6.8	75
All studies	91		69		42		5.0	70

Notes: The three columns show p-values for t-tests. T-test for payout ratio, t-test for last period payout ratio and t-test for WTP are for T1 and T2 are reported as in the first row, as T1 and T3 in the second row. Standard errors in parentheses. * significance at the 10% level, ** significance at the 5% level.

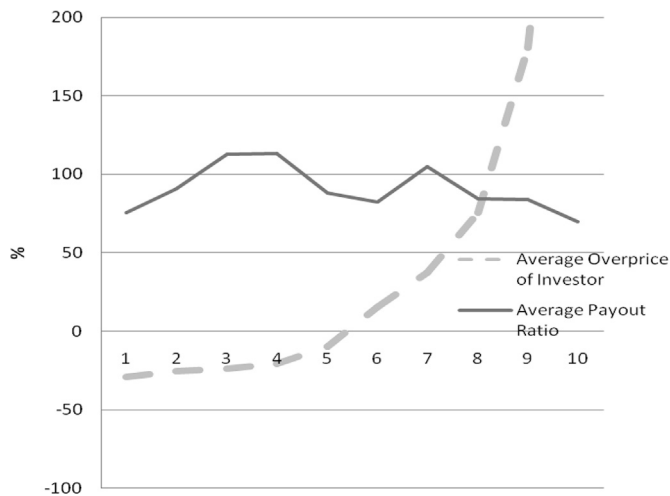


Fig. 1. Payout ratio and difference with rational price.

price calculation. Rational price is defined as average profit times 11, minus current round number (e.g. this number will be $(2 + 12)/2 \times 10 = 70$ in the first round). Investors purchase more shares when dividend policy is investor-determined, on average 3.8, 4.8, 6.8 for studies 1, 2, and 3 respectively. This is a sign that the investors trust their own decisions at a higher rate.

Fig. 1 shows the investor or manager's dividend distribution and it can be seen that towards the end of the experiment the dividend level declines as expected. There are very few managers observed trying to distribute dividends which are greater than profits generated. Most of the managers and investors behave strategically but the investor's also protect the manager's rights. The investors don't distribute all profits. Fig. 1 shows that investors continue to purchase shares towards the end of the experiment and the managers continue to distribute dividends. Irrational pricing behavior is observed especially in the second part of the experiment and investors overprice for 68% of the transactions.

Table 3 shows the surplus division between the manager and the investor. Table 3 shows the investor has 39% of the total surplus. The investor has negative profit in the first three rounds but realizes increased profit through the experiment and has highest profits in the second half due to dividend collection. The manager has the lowest profit in round 4 and the highest profit in the last round of the experiment.

Note that the managers maximize profit in round 8. There is no significant difference between dividends quoted in periods;

however, managers decrease the payout ratio towards the end of the experiment. Dividend and company profit are positively related. There is no finding which proved investors' rational pricing mechanisms in the second half of the experiment. They follow discounted prices in the first half.

The investors calculated an average price but not the time value of the price. The investors quoted higher prices than the rational prices 60% of the time (Only 163 out of a total of 410 observations quoted at less than implied price). The moral hazard problem was not present in this experiment where the managers did not have strong control and power. One manager quoted very high dividends and was bankrupted. Only three managers quoted 0 as dividend and two in the last session. Few managers acted strategically and quoted higher dividends in the earlier periods. Only one investor quoted 0 as price and not in the last round.

Table 4 shows simple regressions run to examine the significance of predictions of Hypotheses 1–5. Subject heterogeneity was controlled for via fixed effects. Otherwise random effects are used.

Result 1. Hypothesis 1 is supported in that the dividend depends on the company's profit in the period. That is, the manager does allocate some of the profit to investors. As discussed earlier, this is likely due to fairness motives since the investor cannot observe company profit and the manager is able to expropriate the profit or to make a strategic decision without regard to profit.

Result 2. Hypothesis 2 is supported. Prices paid by the investor depend on dividend payment. Thus, the investor acts as a reciprocator. Surprisingly neither the managers nor the investors act strategically towards the last period and the investors continue to quote high prices towards the last round of the experiment. The managers don't act strategically where rationally they would be expected to decrease the dividends to 0 in the last round, especially when the dividends are announced after investors bid for shares. As expected the Results 1 and 2 are in line with Brav et al.'s (2005) findings.

Result 3. Hypothesis 3a is not supported. While there is evidence that the dividend declines over time as indicated by the sign of the time coefficient as well as supporting evidence in Fig. 4 and Table 2, this effect does not appear significant in the regression. In Hypothesis 3b, however, investor willingness to pay still exhibits a strong time effect and is affected negatively with time. Since strong treatment effects are not observed in the regression, the result of the model does not provide support for Hypotheses 4a and 4b. The willingness to

Table 3
Surplus division statistics.

Treatment	Investor surplus division %	Manager surplus division %	Total surplus generated	Average investor total profit at the end of session	Average manager total profit at the end of session
Dividend before ^a	86.6	13.4	655	603	508
Dividend after	20.3	79.7	1145	515	561
Investor control	37.6	62.4	1149	536	579
Overall average	39.3	60.7	983	533	550

^a One manager bankrupted in this experiment (dividend before) effecting the results of 12 pairs, therefore one bankrupted manager's pair is excluded out of the numbers. If the bankrupted manager is included in the numbers, the numbers change as: Total Surplus: 828, Total Manager's Profit: 412, Total Investor's Profit: 1240. In that case the Investor gets 100% of the surplus.

Table 4
Regression analysis and model.

	Dividend	Dividend/Profit per share	Manager's profit per round	Investor's Willingness to Pay (WTP)
Intercept	1.04 (0.52)	0.80** (2.3)	−0.82 (−0.19)	44.79** (8.05)
Company profit per share	0.45** (H1) (4.18)			
Dividend _{t-1}	0.15** (2.53)			
Dividend				0.72** (H2) (3.46)
Time	−0.14 (−1.31)	−0.03 (H3a) (−1.62)		−3.05** (H3b) (−2.9)
Cumulative number of shares			3.91** (H5) (9.67)	3.89** (2.35)
Investor's profit per round			−0.38** (H5) (−13.44)	
Treatment effect (dividend before)				−8.36 (H4a) (−1.21)
Treatment effect (investor control)				−0.88 (H4b) (−0.13)
R ²	0.441	0.479	0.643	0.059
Heterogeneity specification	Fixed effects	Random effects	Random effects	Random effects

Notes: Standard errors in parentheses.

*Significance at the 10% level, ** significance at the 5% level.

pay by the investor in a setting where the manager declares dividends before trading will not differ from the willingness to pay by the investor in a setting where the manager declares dividends after trading or where the investor decides on the dividends. The experiment does not lead to changes in investor's WTP in different settings. This may be partially due to the effect that the investors highly overprice the shares until the end of the experiment (especially in the second part of the experiment). If there is a difference in WTP in different settings, this may not be measurable since the overpricing of the shares could be dominating the price.

In line with Camerer (2003) the results show that managers do not act self-centered and similar to ultimatum game studies they distribute a reasonably high portion of the profit of the company as dividends to the investors. They continue to distribute dividends even when it is not economically rational for them to do so. The results also show that backward-induction is not used and investors are not acting fully rationally in their share purchases and do not take the time factor into consideration. Although they decrease the willingness-to-pay with time the amount of decrease is not in line with a rationally expected decrease of willingness-to-pay for shares.

Result 4. The relationship between the profit of the manager and the investor is tested and significant results are found supporting Hypothesis 5. Investor's willingness to pay is affected positively by the dividend and the cumulative number of shares, and is affected negatively with passing time. Investors increase their prices as dividends increase and adjust their pricing strategy as a session progresses toward its end. WTP is expected to gradually diminish to 0 for the rational investor as the session progresses towards its end. That this effect was not observed in our experiment is an important finding of this study.

The number of shares in circulation has a positive effect on investors' willingness to pay and the reason for this effect is not very clear. This brings to mind that they may be willing to purchase more shares since they own some already and this may mean that they attach a high value to them (endowment effect). However, if the session's end is approaching, then it is not rational to quote higher prices. Nonetheless, it was observed that the investors do not act on this information even though they are already informed that the shares will be

worthless by the end of the experiment. Instead, they act with bounded rationality. In spite of the information they have, they do not act upon this information and continue to bid for shares at a price higher than the rational price ($R^2 = 0.059\%$). The result indicates that the profitability of the manager increases where the profitability of the investor decreases and vice versa. The manager's profitability increases with investor control, since they purchase more shares because they trust more, hence the investor's profitability on the average is not maximized with this behavior.

4. Discussion

Akyıldırım and Soner (2014) suggest that standard finance models assume the markets to be efficient and the investors are rational, hence many studies find human irrationality in investments causing investment losses. The purpose of this work was to investigate the implications of moving from the traditional compensation paradigm where the investor is the owner and the manager serves at the investor's pleasure to a possibly more realistic paradigm where the investors and the management team have a seemingly more adversarial relationship involving the division of the surplus. This relationship has clear and serious implications regarding profit expropriation by the manager in the later stages of the asset's life and consequently investors' withholding capital. What is observed is more of a trust game pattern, where investors trust the managers with their capital and managers, with some exceptions, not exhibiting opportunism to the extent expected from rational selfish managers. The rational principal agent model, which predicts that by the end of the experiment the price and the dividend should decline to zero, is not fulfilled. Instead, there is only a small decrease in prices and dividends over time. It is encouraging to see that investment occurs despite the strong rational investment prediction of no trade. This is because managers are not selfish-rational so there is no unraveling to zero investment. The results show that the managers are more generous as decision maker for dividend distribution compared to investors.

The results of this study can be linked to the experimental study of Andreoni (1995) who finds that kindness and

confusion are significant in ‘giving’ experiments. According to his findings it is against rational expectation to find that people who understand free-riding, give anyway. This result can be used for improving regulatory policy to limit free-riding and self-interested behavior mechanisms by managers in line with Fehr and Gächter's (2000) findings of reciprocity. Particularly, crowding out of fairness through regulation (by government) or monitoring (by the board or by auditors) is the natural extension that comes to mind.

In future research these improvements could be studied. A structural break was not tested specifically for, but strong declining dividends and WTP towards the end of the game suggest strong strategic concerns. As we observed non self-interested behavior in our limited set-up, it may be useful to suggest analyze of the behavior of the investor and manager in an experiment having multiple assets, different managerial control options and a real market environment with a share purchase option to further analyze the effect of the real market on behavioral aspects.

Appendix.

Experiment instructions

Welcome and thank you for your participation. Your role is ___Investor ___Manager.

This session will take 15 min. The roles are randomly assigned. You are paired with another anonymous participant. One of you will act as an *investor*; the other will act as a *manager*. Your earnings will depend on your actions and the actions of the other participant. The experiment involves 10 rounds, and there are two stages per round. There will be two trial rounds.

Stages of each round.

Stage 1:

Both manager and the investor begin with 500 tokens.

The *profit-per-share* is a random number between 2 and 12 tokens. The average profit per share in each round is 7 tokens (7×10 periods = 70 tokens over all periods).

The manager and the investor both see the *profit-per-share*.

[In Treatment Dividend Before add: The manager decides on the *dividend*.]

[In Treatment Investor Control add: The investor decides on the *dividend*.]

Stage 2:

- The investor enters a price he or she is willing to pay for the share.
- The market price of the share is determined as follows: There is a reservation price calculated by the computer, which is the minimum acceptable market price (a random number from 0 to 90). The investors' stated bid price for the share can be lower than this random number. In that case no transaction will take place. The investor will not pay anything and will not receive any shares.

- If the investor's price is higher than the reservation price, he purchases one share at the reservation price and pays the amount to the manager to be deposited to company accounts. If a share is purchased, manager earns 10% commission on the market price.
- [In Treatment Dividend After add: The manager decides on the *dividend*.]
- The manager pays the dividend for all shares held by the investor. The investor receives the *dividend* for all shares held by the investor.

Method for Calculation of Reservation Price: The minimum share purchase price in each period will be decided according to Becker-DeGroot-Marschak method. There will be random number of profit generated by the computer for each round and this number will be multiplied by 10. The reservation price will decline with the number of the remaining periods.

Value of a share to investor:

The investors receive a dividend for each share they hold at the end of each period. The dividend may be less than, equal to, or greater than the profit generated per share. There is a limit for maximum dividend paid to investors.

The value of each share to the investor is the entire expected dividend stream for that share. For example, if there are 6 periods left, a share is worth the sum of dividends in these 6 periods.

- At the end of 10 rounds [In Investor Control Treatment: or if the manager decides to terminate the session earlier], all shares will be worthless (will be worth zero tokens).

Manager earnings: In each round the *manager* earns the profit per share minus the dividend on each share held, plus a 10% commission on the market price if a share is purchased in the period.

Investor's earnings: In each round, the *investors* earn the dividend times the number of shares they hold, minus the amount paid for shares purchased.

Earnings are cumulative for the ten rounds and include the 500 tokens participants begin with. Tokens are converted to dollars at a rate of 200 tokens = \$1.

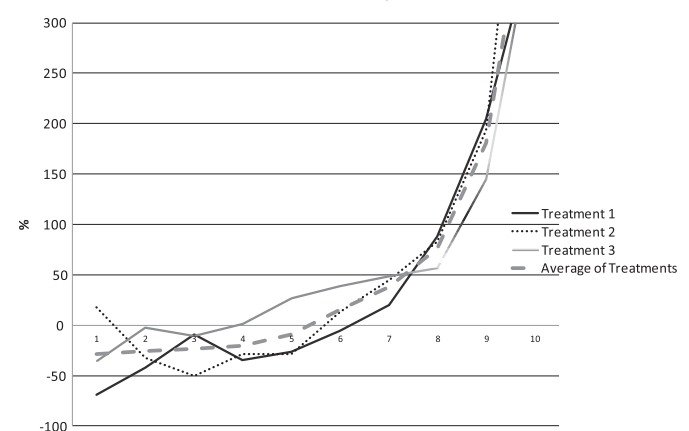


Fig. 2. Differences of Investor and Rational Price.

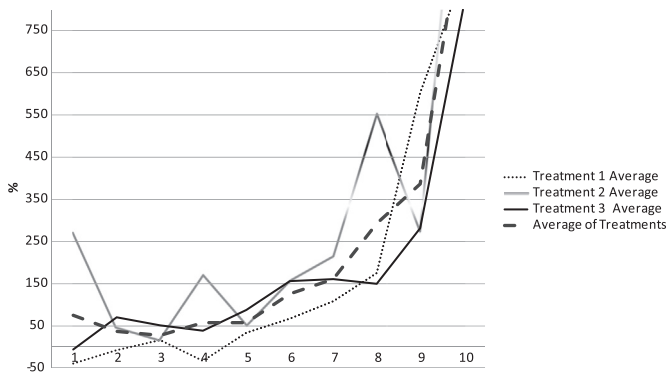


Fig. 3. WTP Difference of Investor and Manager.

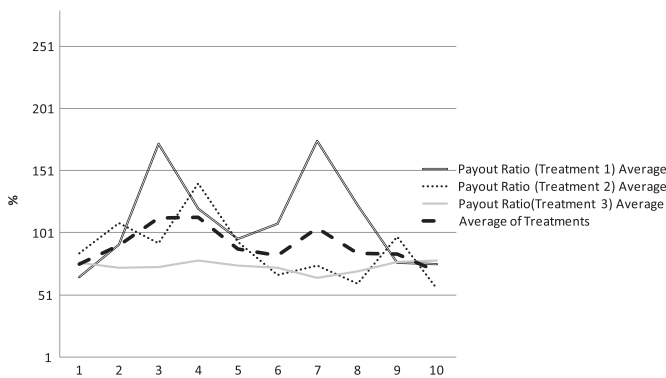


Fig. 4. Payout Ratio.

References

- Akyıldırım, E., & Soner, M. (2014). A brief history of mathematics in finance. *Borsa İstanbul Review*, 14, 57–63.
- Allen, F., & Michaely, R. (1995). Dividend policy. In A. Jarrow, V. Maksimovic, & W. T. Ziemba (Eds.), *Handbooks in operations research and management science: Finance* (Vol. 9, pp. 793–837). North-Holland.
- Andreoni, J. (Sep 1995). Cooperation in public-goods experiments: kindness or confusion? *The American Economic Review*, 85(4), 891–904.
- Ariely, D. (2010). *The upside of irrationality*. London: Harper Collins, ISBN 978-0-06-199503-3.
- Benartzi, S., Michaely, R., & Thaler, R. H. (1997). Do changes in dividends signal the future or the past? *Journal of Finance*, 52(3), 1007–1034.
- Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behaviour*, 10, 122–142.
- Bertrand, M., & Mullainathan, S. (Aug 2001). Are CEOs rewarded for luck? The ones without principals are. *The Quarterly Journal of Economics*, 116(3), 901–932.
- Black, F., & Scholes, M. (May 1974). The effects of dividend yield and dividend policy on common stock prices and returns. *Journal of Financial Economics*, 1(1), 1–22.
- Brav, A., Graham, J. R., Harvey, C. R., & Michaely, R. (September 2005). Payout policy in the 21st century. *Journal of Financial Economics*, 77, 483–527.
- Camerer, C. F. (2003). Behavioral studies of strategic thinking in games. *Trends in Cognitive Sciences*, 7(5), 225–231.
- Camerer, C. F., Johnson, E., Sen, S., & Rymon, T. (2002). Detecting failures of backward induction: monitoring information search in sequential bargaining. *Journal of Economic Theory*, 104(1), 16–47.
- Cremers, M., & Palia, D. (2010). *Tenure and CEO pay*. SSRN Working Paper, June 18 <http://ssrn.com/abstract=1626950>.
- Crotty, J. R. (Summer 1990). Owner-manager conflict and financial theories of investment instability: a critical assessment of Keynes, Tobin, and Minsky. *Journal of Post Keynesian Economics*, 12(4), 519–542.
- Dalton, D. R., Daily, C. M., Certo, S. T., & Roengpitya, R. (2003). Meta-analyses of financial performance and equity: fusion or confusion? *Academy of Management Journal*, 46(1), 13–26.
- De Bondt, W. F. M. (1998). A portrait of the individual investor. *European Economic Review*, 42(3–5), 831–844.
- Demirtas, K. O., & Zirek, D. (May–June 2011). Aggregate earnings and expected stock returns. *Emerging Markets. Emerging Markets Finance and Trade*, 47(3), 4–22.
- Ertimur, Y., Muslu, V., & Ferri, F. (2009). Shareholder activism and CEO pay. August 15 *Review of Financial Studies*, 24(2), 535–592, 2011.
- Falk, A., & Kosfeld, M. (Dec 2006). Trust, the hidden costs of control. *The American Economic Review*, 96(5), 1611–1630. Published by: American Economic Association.
- Fehr, E., & Gächter, S. (Summer 2000). Fairness and retaliation: the economics of reciprocity. *The Journal of Economic Perspectives*, 14(3), 159–181.
- Fehr, E., Krehmelmer, S., & Schmidt, K. M. (2008). Fairness and the optimal allocation of ownership rights. *The Economic Journal*, 118(531), 1262–1284.
- Fischbacher, U. (2007). z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10(2), 171–178.
- Fosberg, R. H. (January 1997). Dividend changes and CEO compensation. *The Southern Business and Economic Journal*, 20(2), 84–96.
- Gerhart, B., Rynes, S. L., & Fulmer, I. S. (2009). Pay and performance: individuals, groups, and executives. *Academy of Management Annals*, 3(1), 251–315.
- Guiso, L., Sapienza, P., & Zingales, L. (2008). Trusting the stock market. *The Journal of Finance*, 63(6), 2557–2600.
- Haruvy, E., Lahav, Y., & Noussair, C. (2007). Traders' expectations in asset markets: experimental evidence. *American Economic Review*, 97(5), 1901–1920.
- John, T. A., & John, K. (1993). Top-management compensation and capital structure. *Journal of Finance*, 48(3), 949–974.
- Kirkulak, B., & Kurt, G. (2010). Are dividends disappearing or shrinking? Evidence from the Istanbul stock exchange. *Emerging Markets Finance and Trade*, 46(2), 38–52.
- Kumar, P. (1988). Shareholder-manager conflict and the information content of dividends, review of financial studies. *Oxford University Press for Society for Financial Studies*, 1(2), 111–136.
- Lunawat, R. (2012). The role of information in building reputation in an investment/trust game. *European Accounting Review*, 1–20. ahead-of-print.
- Lunawat, R. (2013). An experimental investigation of reputation effects of disclosure in an investment/trust game. *Journal of Economic Behavior & Organization*, 94, 130–144.
- Miller, M., & Rock, K. (September 1985). Dividend policy under asymmetric information. *The Journal of Finance*, 40(4), 1031–1051.
- Ryan, H. E., Jr., & Wiggins, R. A., III (2001). The influence of firm- and manager-specific characteristics on the structure of executive compensation. *Journal of Corporate Finance*, 7(2), 101–123.
- Sappington, D. E. M. (Spring 1991). Incentives in principal-agent relationships. *The Journal of Economic Perspectives*, 5(2), 45–66.
- Statman, M. (2014). Behavioral finance: finance with normal people. *Borsa İstanbul Review*, 14, 65–73.
- Tosi, H. L., Werner, S., Katz, J. P., & Gomez-Mejia, L. R. (2000). How much does performance matter? A meta-analysis of CEO pay studies. *Journal of Management*, 26(2), 301–339.